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A New Species of the Macrourid Fish Genus *Coelorinchus* from off Tasmania, New Zealand, and the Falkland Islands

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Abstract *Coelorinchus kaiyomaru* (Gadiformes: Macrouridae) is described from 32 specimens collected off Tasmania and New Zealand, and one specimen from waters off the Falkland Islands. The new species is readily distinguished from other species of *Coelorinchus* by: the long snout; squamation on head and trunk; absence of a continuous anterolateral edge in the nasal bones (i.e., median and lateral processes not united); a small light organ that lacks a secondary duct; and extent of trunk pigmentation. The new species was previously confused with *C. innotabilis* McCulloch, 1907.

The R/V Kaiyo Maru of the Japanese Fisheries Agency recently carried out two exploratory deep-water trawling cruises on the continental slope of Australia and on the Norfolk Ridge (1975～76) (Suisancho, 1976), and on the rises of the southern and eastern parts of New Zealand (1977～78) (Suisancho, 1978). The first author made numerous collections of fishes during the latter cruise (Arai, 1979), amongst which were two species of *Coelorinchus* (family Macrouridae) characterized by their notably long, slender, sharply pointed snout. Of the eight nominal species of *Coelorinchus* reported to date from waters off Tasmania and New Zealand (Whitley, 1968; Scott, 1970), only two, i.e. *C. kermadecus* Jordan et Gilbert, 1904, and *C. innotabilis* McCulloch, 1907, are characterized by a long pointed snout. One of the two Kaiyo Maru species could be readily identified with *C. innotabilis*, but the second could not be identified with any known species. Subsequent correspondences with the second author revealed that two large specimens he had reported (Iwamoto, 1978) as *C. innotabilis* were actually representatives of this hitherto undescribed species. A further search of U.S.N. Eltanin collections housed in the Natural History Museum of Los Angeles County turned up additional specimens of this species, and a collaboration in describing the new species was initiated.

Methods and materials

Measurements and counts were taken in accordance with the methods described by Hubbs and Lagler (1958) and Iwamoto (1970, 1978). Terminology for the head ridges follows Iwamoto (1978: fig. 2) which is slightly modified from Okamura (1970a).

Type-specimens and other specimens of the new species are deposited in the Auckland Institute and Museum (AIM), Australian Museum, Sydney (AMS), California Academy of Sciences, San Francisco (CAS), Faculty of Agriculture, Kyoto University, Maizuru (FAKU), Far Seas Fisheries Research Laboratory, Shimizu (FSFL), Natural History Museum of Los Angeles County (LACM), National Museum of New Zealand, Wellington (NMNZ), National Science Museum, Tokyo (NSMT-P), Tasmanian Fisheries Development Authority, Hobart (TFDA), and Department of Zoology, University Museum, University of Tokyo (ZUMT). In the list of material examined, plus marks (+) with TL indicate that the given specimens have incomplete tails.

Coelorinchus kaiyomaru, sp. nov.

(Figs. 1～7)

Coelorhynchus sp. F; Suisancho, 1976: 144 (listed by Fujii).

Coelorinchus innotabilis; Iwamoto, 1978: 331 (in part, two large specimens).

Coelorinchus sp. H; Suisancho, 1978: 99 (listed by Arai and Yabumoto).

Diagnosis. A species of *Coelorinchus* with long, slender, sharply pointed snout; its length 43～48% HL, 0.5～0.7 into orbit diameter.

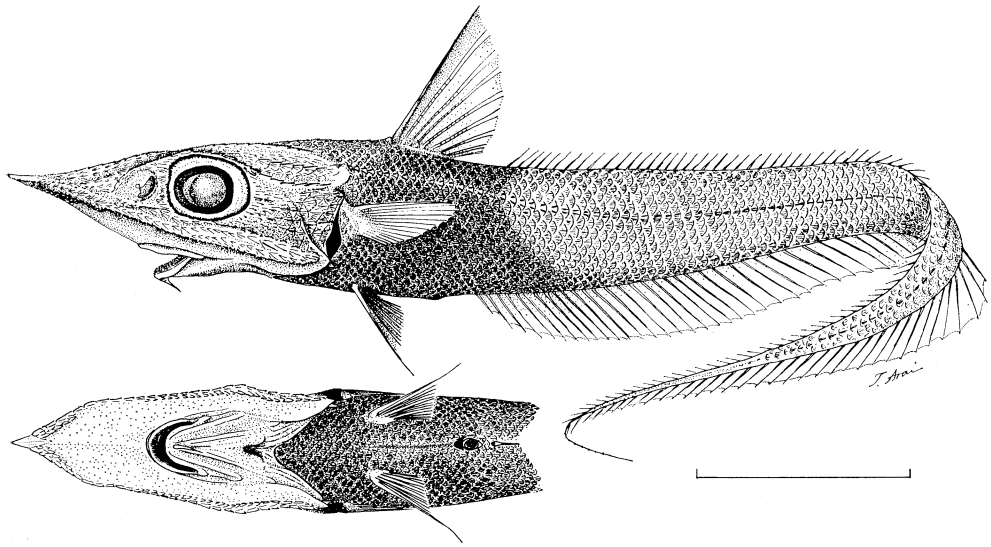

Fig. 1. *Coelorinchus kaiyomaru*, sp. nov. Lateral and ventral views of holotype (NSMT-P 18504, 79 mm HL, 350 mm TL) from Chatham Rise slope, east of New Zealand, in 1006～1050 m. Scale line indicates 50 mm.

Normally no scales on ventral aspects of head except along anterolateral margin of snout. Naked areas dorsally behind anterolateral margins of snout confined to narrow strips; anterolateral edges of snout not supported by bone (median and lateral processes of nasal bone not united). Dark blue area of abdomen extends to first dorsal base; orbital rim black or blackish. Anus removed by about two scale rows from anal fin. Ventral light organ very small, situated just before anus, and lacking a secondary duct.

Description of holotype (comments on paratypes in parentheses). General shape as in Fig. 1. A long slender fish with sharply pointed snout. Head about 4.5 (3.8～4.4) into total length. Supraoccipital crest inconspicuous, forming an almost straight line in profile. Trunk moderately compressed, greatest body width over pectoral bases about 1.3 (1.2～1.3) into greatest body depth. Orbit of moderate size, about 1.9 (1.4～1.9) into snout length and about 3.9 (3.3～4.1) into head length. Snout long and sharply pointed; a low hump above nostrils in dorsal profile; median and lateral processes of nasal bones not united. Anterior rim of orbit moderately wide and flattened with one transverse row of scales armed with two to four reclined spinule rows. Mouth relatively small, beginning below hind margin of posterior nostril; upper jaw extending posteriad to below middle of orbit. Barbel thin, short, its length about 4.1 (3.6～5.5) into orbit diameter. Head ridges stout, sharp; supraoccipital, parietal, and postorbital ridges formed of stout scales beset with sharply serrated, keel-like ridges; supranarial ridge well separated from suborbital ridge. Suborbital ridge relatively broad below and behind orbit but narrow anteriorly and a slight discontinuity behind lateral process of snout or just below scute-like scale at anterior end of supranarial ridge; ridge branching below hind margin of posterior nostril into two rows of scute-like scales with upper one extending to posterior one-third of orbit; lower branch of ridge again branching below anterior 1/3 of orbit; thus number of rows of scute-like scales composed of 1 from tip of snout to below posterior nostril, 2 from below posterior nostril to below anterior 1/3 of orbit, 3 from below anterior 1/3 to below posterior 1/3 of orbit, and again 2 from below posterior 1/3 of orbit to end of ridge (Fig. 2). Vertical and horizontal margins of preopercle form acute angle posteroventrally, vertical margin somewhat concave; ventral tip of subopercle produced into a flexible, pointed tab, its tip

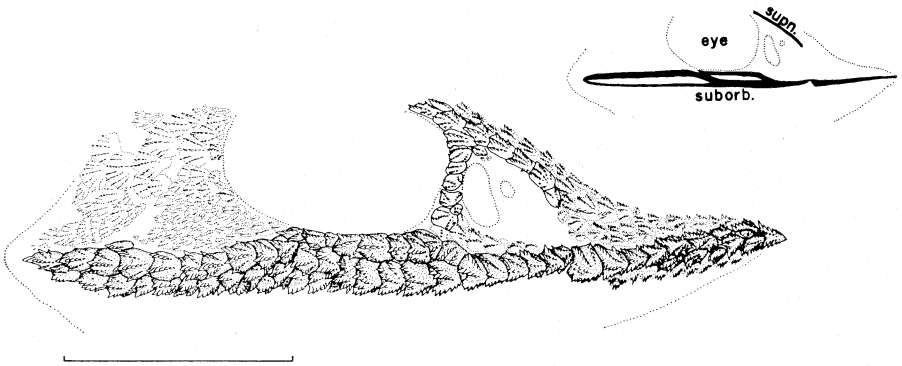

Fig. 2. Suborbital ridge of *Coelorinchus kaiyomaru*, sp. nov. (NSMT-P 18546, paratype, 73 mm HL), cleared and stained. Abbreviations: supn., supranarial ridge; suborb., suborbital ridge. Scale line indicates 20 mm.

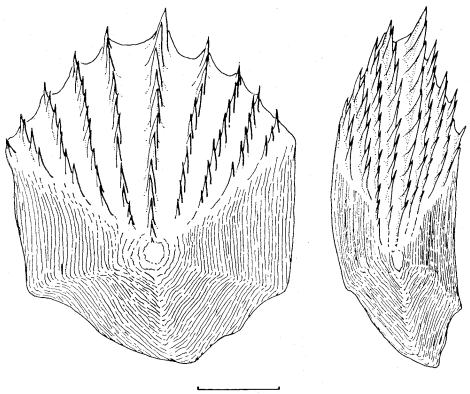

Fig. 3. Body scale of *Coelorinchus kaiyomaru*, sp. nov. (NSMT-P 18504, holotype, 79 mm HL) from between first dorsal base and lateral line. Right figure is viewed from an oblique angle. Scale line indicates 1 mm.

slightly exposed beyond posteroventral margin of preopercle. Interopercle completely hidden behind preopercle.

Scales on body of moderate size and covered with rather short, reclined spinules, each aligned in 8～10 close longitudinal rows on large trunk scales (Fig. 3). Middle spinule row somewhat enlarged on nape scales and on scales between first dorsal base and lateral line, but middle row reduced on scales ventrolaterally on abdomen and tail; outer rows on field very slightly divergent from middle rows. Most scales on head with more divergent spinule rows. No enlarged scute-like scale just before origin of lateral line. Naked areas on dorsal surface of snout restricted to nasal fossae and narrow strips behind leading edge of snout (Fig. 4). Terminal snout scute somewhat arrowhead shaped in dorsal and ventral views, depressed and armed with several longitudinal rows of small blunt spinules, its rows diverge posteriorly from anterior apex. Ventral surface of head almost naked except along anterolateral margin of snout (in few paratypes, a single isolated scale below juncture of infraorbital and preopercular portions of ridge).

Light organ small, short, and lacks a secondary duct; externally manifested by only a small blackish naked area just in front of anus, this organ preceded by a blackish median streak that extends from anus to between pelvic bases (to beyond pelvic bases in some paratypes). Internally, luminous gland small, rounded, depressed; its dorsal surface light brownish with many small melanophores; luminous gland surrounded anteriorly and laterally by a jelly-like transparent tissue; its tip extending anteriorly along external blackish median streak in 83-mm-HL paratype (Fig. 5).

Gill membranes tightly connected to isthmus with no posterior free fold. Outermost gill slit about half diameter of pupil. Gill-rakers tubercular and armed with very small spines.

Fins generally small; first dorsal fin slightly shorter than postrostral length of head. Long spinous second ray extends beyond adjacent segmented rays. First and second dorsal fins separated by a gap equal to about 1.0 (0.9～2.1) into length of first dorsal base.

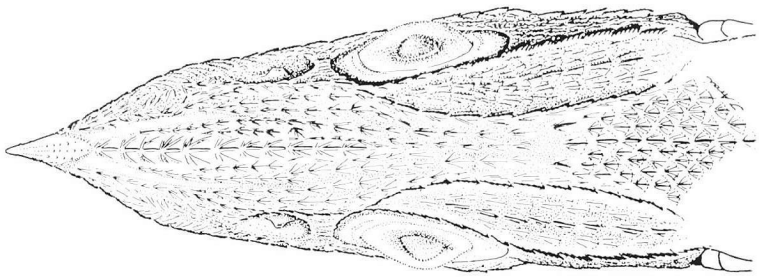

Fig. 4. Dorsal aspect of head of *Coelorinchus kaiyomaru*, sp. nov. (NSMT-P 18504, holotype, 79 mm HL).

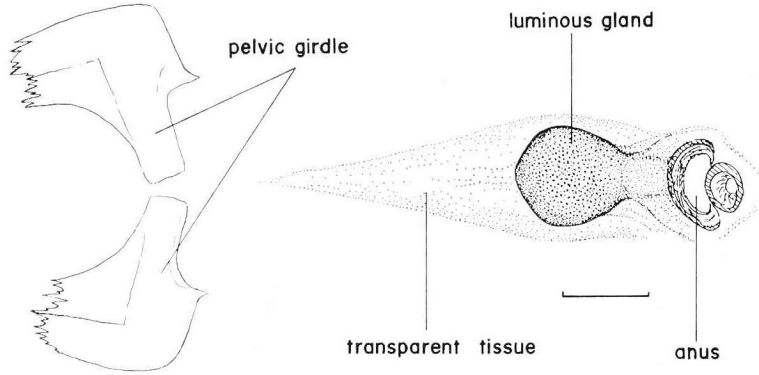

Fig. 5. Light organ (dorsal view) of *Coelorinchus kaiyomaru*, sp. nov. (NSMT-P 18513, paratype, 83 mm HL), muscle and pigmented membrane of abdominal wall removed. Scale line indicates 3 mm.

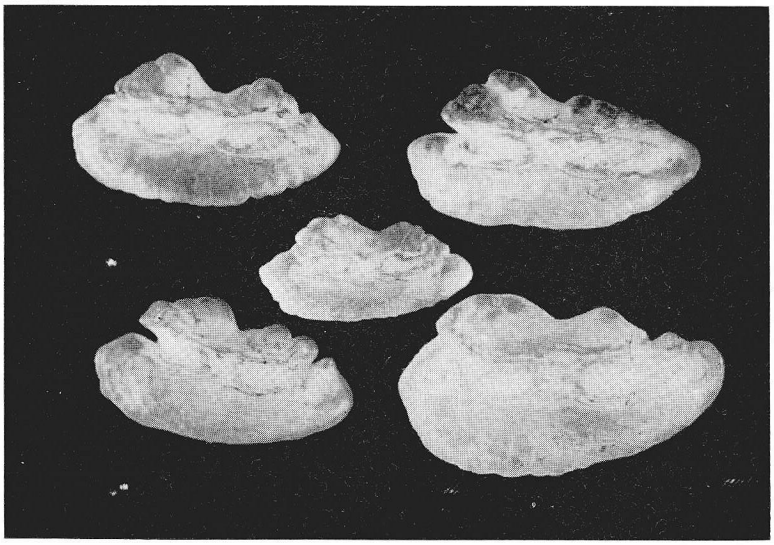

Fig. 6. Otoliths (five left sagittae) of *Coelorinchus kaiyomaru*, sp. nov. from fresh specimens. Lengths and heights of five otoliths are: left top, 9.9×5.4 mm; left bottom, 10.9×6.1 mm; middle, 7.0×3.6 mm; right top, 8.9×5.0 mm; right bottom, 8.6×4.8 mm. Photograph provided by John E. Fitch.

Intestinal coiling relatively simple, about like that of *Coelorinchus smithi* Gilbert et Hubbs, 1920, as illustrated by Okamura (1970b: fig. 65D). Pyloric caeca long and slender, unbranched, its length about 0.8～0.9 into orbit diameter in 4 paratypes (81～91 mm HL) from off New Zealand; its number 10～14 in 14 paratypes. Four females examined had large ovaries containing yellowish eggs; in a 91-mm-HL paratype collected on 20 December 1977, largest eggs more than about 1.3 mm in diameter. Gas bladder in 83-mm-HL paratype well developed with 4 large gas glands each connected to a short, somewhat broad rete. Stomach of 83-mm-HL paratype full of small deep-sea decapods and remains of gastropod shells; a 23-mm polychaete taken from everted stomach of 63-mm-HL paratype. Otolith shapes of five fresh specimens as in Fig. 6.

Coloration in formalin: light brownish on dorsal surface of head; operculum blackish to dark bluish; under surface of head greyish; orbital rim blackish (in some paratypes, blackish edge absent or faded ventrally and posteriorly); dark blue of trunk region completely encircling body; tail light brownish. All fins dusky (most specimens) to blackish (LACM 11447-5); membrane between 2nd spinous and 1st branched dorsal rays blackish. Gill membranes blackish; lips and chin barbel whitish; oral and branchial cavities completely blackish; gill arches blackish, gill-rakers somewhat pallid; abdominal cavity whitish except anterior part dark brownish. (Coloration in fresh 91-mm-HL paratype: head pinkish; abdomen and base of first dorsal to interspace

Table 1. Range, mean ($\bar{x}$) and standard deviation (SD) of measurements from 32 type-specimens from western South Pacific off New Zealand and Tasmania and 1 specimen from western South Atlantic off Falkland Islands of *Coelorinchus kaiyomaru*, sp. nov. Total length and head length in millimeters; other measurements in % of head length.

Character	New Zealand and Tasmania				Falkland Is.
	range	$\bar{x}$	SD	N	(LACM 10449-6)
Total length	217 ～350+				338
Head length	50 ～ 98				67
Body depth	41.4～ 49.8	45.51	2.46	30	56.7
Postrostral length	48.2～ 59.6	54.20	2.57	32	55.2
Snout length	42.9～ 47.5	45.88	1.37	32	44.8
Preoral length	35.6～ 46.2	42.66	2.08	32	40.4
Snout width	20.1～ 28.6	23.21	1.86	28	25.4
Internasal space	18.7～ 22.8	20.62	1.36	26	19.9
Orbit diameter	24.4～ 30.1	27.36	1.30	32	27.2
Interorbital width	17.3～ 22.8	19.96	1.18	32	22.8
Postorbital length	23.9～ 28.4	26.24	1.06	32	25.1
Orbit to angle preop.	28.4～ 34.9	30.52	1.30	31	31.3
Suborbital width	11.2～ 14.9	12.98	1.02	32	13.0
Upper jaw length	16.2～ 23.3	20.63	1.40	31	22.7
Barbel length	5.1～ 7.5	6.11	0.68	25	6.1
Preanal length	138.0～154.1	145.30	3.75	31	153.7
Prevent length	130.4～139.0	135.43	3.36	4	143.6
Outer pelvic to anal	31.5～ 44.7	36.89	2.81	32	46.3
Isthmus to anal	55.5～ 70.9	62.70	3.79	31	74.8
Isthmus to anus	47.5～ 61.7	54.68	3.71	29	68.5
1D. base length	9.7～ 23.2	19.24	2.59	26	22.4
1D.—2D. interspace	8.8～ 20.4	15.87	3.28	32	19.7
Height first dorsal	43.3～ 56.3	50.11	4.19	16	～48
Length pectoral fin	35.7～ 44.4	39.79	2.33	29	44.8
Length pelvic fin	30.9～ 46.8	38.18	3.81	30	44.3
Length 1st gill-slit	4.4～ 10.4	6.75	1.55	27	9.3

of dorsals dark bluish; tail pinkish. All fins dusky or blackish.)

Measurements and counts: Selected measurements and counts are shown in Tables 1 and 2. Other counts are: pelvic rays 7; gill-rakers on first arch 1~2+5~7; on second arch 0~2+5~7; scales below 1D. 5~8 (usually 6 or 7); below 2D. 5~6$^1/_2$; below mid-base of 1D. 4$^1/_2$~5$^1/_2$ (rarely 4 or 6$^1/_2$).

Comparison. In the western South Pacific (Australia-New Zealand region) the new species is likely to be confused only with *C. innotabilis* with which it shares a long, slender, sharply pointed snout, naked ventral head surface, and general coloration of body. The two species are easily differentiated by the presence in *C. innotabilis* of a shorter snout (0.7~0.9 into orbit diameter vs. 0.5~0.7); naked areas on dorsolateral surfaces of snout very broad (cf. very narrow in *C. kaiyomaru*); anterolateral edges of snout strongly supported by bone (median and lateral processes of nasal bones united) (cf. not supported by bone in *C. kaiyomaru*); dark blue area on abdomen extends only to uppermost extent of pectoral base (cf. to first dorsal base and interspace between dorsals in *C. kaiyomaru*); and long light organ with a secondary duct (cf. short, without a secondary duct in *C. kaiyomaru*). The completely scaled ventral head surface, strongly enlarged median keel and parallel course of spinule rows of body scales of *C. kermadecus* make that species unlikely to be confused with the new species.

In the eastern Pacific, where *C. kaiyomaru* is yet to be recorded, *C. innotabilis* and *C. chilensis* Gilbert and Thompson, 1916, are the only *Coelorinchus* species with long, sharply pointed snouts. The two are immediately distinguishable from the new species by the extent of the bluish color on the trunk and by the absence of broadly overlapping scales ventrally along the anterolateral margin of the snout. In addition, *C. chilensis* has coarser scales and a larger orbit (diameter much longer than postorbital length, 1.1~1.2 into snout length, cf. about equal to postorbital length and 1.4~1.9 into snout length in *C. kaiyomaru*).

The long-snouted Atlantic species *C. occa* (Goode et Bean, 1885) and *C. braueri* Barnard, 1925, both with small light organs, have much coarser scales than those of *C. kaiyomaru*, and *C. braueri* has an extensive covering of scales on the ventral head surfaces. The blue color encircling the trunk further distinguishes the new species from these two Atlantic congeners.

Distribution. *Coelorinchus kaiyomaru* is known from the cold-temperate waters of the western South Pacific off Tasmania and New Zealand, and in the western South Atlantic off Falkland Islands between latitudes 43°48′S and 53°59′S and between depths of 845 and 1050 m (Fig. 6).

Etymology. The species is named from the fisheries research vessel Kaiyo Maru and is to be treated as a noun in apposition.

Remarks. Slight differences were found be-

Table 2. Counts of first dorsal soft rays, pectoral rays, pyloric caeca and lateral-line scales over distance equal to predorsal length in *Coelorinchus kaiyomaru*, sp. nov. from New Zealand, Tasmania and Falkland Islands.

Locality	1st D. soft rays				Pectoral rays					Pyloric caeca				
	7	8	9	10	17	18	19	20	21	10	11	12	13	14
New Zealand	1	5	12	2	6	8	16	8	1	1		3	1	4
Tasmania		2	9	1		8	12	3		1		3	2	
Falkland Is.			1		1	1						1		

	Lateral-line scales over distance equal to predorsal length									
	32	33	34	35	36	37	38	39	40	41
New Zealand	1			4	4	1	10	11	3	1
Tasmania			1	1	5	3	4	3	6	1
Falkland Is.				1						

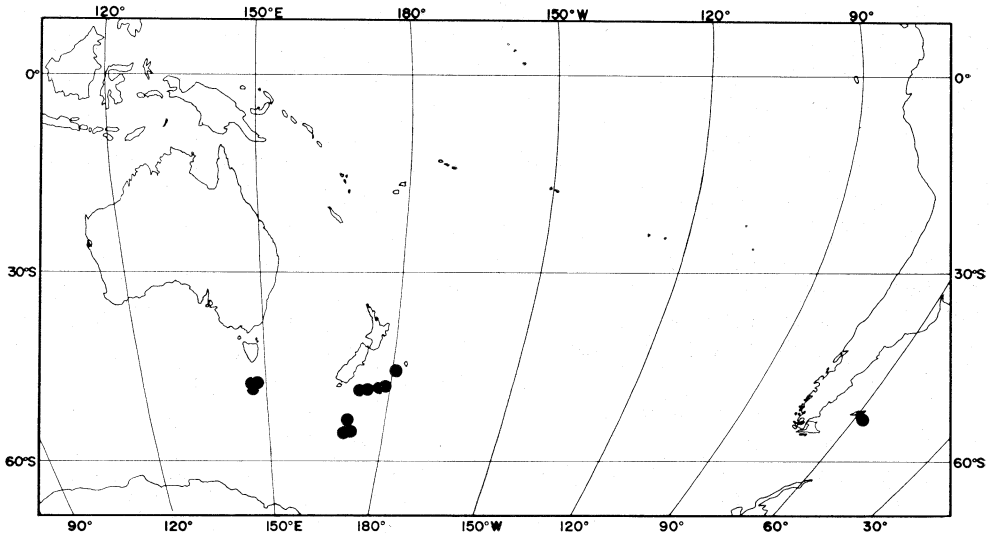

Fig. 7. Distribution of *Coelorinchus kaiyomaru*, sp. nov.

tween the South Atlantic specimen (LACM 10449-6) and those from the western South Pacific. The Atlantic fish had a much thicker trunk (greatest breadth across pectoral bases about 0.9 of body depth at that point, compared with about 0.7～0.8 in western Pacific specimens), the snout viewed dorsally was less acute, the trunk scales had no enlarged median keel—differences which seemed insufficient to warrant recognition of the South Atlantic specimen as distinct from those from the western Pacific. However, when more comparative material becomes available and these and other differences can be more carefully analyzed, a different treatment may be suggested.

Subgeneric allocation of *C. kaiyomaru* is not here attempted as the new species does not readily fit the categories diagnosed in Okamura's (1970a, 1970b) two important works on the Macrouridae. Dr. Okamura is currently revising the genus on a worldwide basis, and subgeneric alignment of the new species will await publication of his work.

Material examined. Western South Pacific off New Zealand and Tasmania (32 type-specimens, 8 localities).

Holotype: NSMT-P 18504 (79 mm HL, 350 mm TL); Chatham Rise slope, off New Zealand, 44°34.2′S, 177°57.9′W, 1006～1050 m, bottom temperature 4.9°C, otter trawl, Kaiyo Maru sta. T-22, 20 Dec. 1977.

Paratypes: NSMT-P 18505～18507 (3 specimens, 83～92 mm HL, 342+～402 mm TL); CAS 42489 (1, 72 HL, 277 TL); FSFL EH 220 (1, 90 HL, 382 TL); FSFL EH 222 (1, 91 HL, 360 TL); NMNZ 9142 (1, 77, HL, 330 TL); same locality as holotype: NMNZ 9143 (1, 81 HL, 289 TL); NSMT-P 18513 (1, 83 HL, 350 TL); Pukaki Rise slope, off New Zealand, 48°30.1′S, 171°58.3′E, 870～919 m, bottom temp. 5.0°C, otter trawl, Kaiyo Maru sta. T-47, 7 Jan. 1978: AMS I. 21202-001 (2, 75～98 HL, 293～350+ TL); FSFL EH 616～617 (2, 50～63 HL, 217～240+ TL); Pukaki Rise slope, off New Zealand, 48°29.3′S, 173°00.8′E, 874～894 m, bottom temp. 5.0°C, otter trawl, Kaiyo Maru sta. T-48, 8 Jan. 1978: AIM 2654～2656 (3, 79～94 HL, 310～366+ TL); Campbell Rise slope, off New Zealand, 53°52′S, 171°13′E, 948 m, bottom temp. 2.8°C, Shinkai Maru sta. 281, 22 Jan. 1977: LACM 11085-1 (1, 82 HL, ca. 300 TL); SW of Campbell Is., 53°49′～52°02′S, 169°57.2′～56.1′E, 971 m, Blake trawl, Eltanin sta. 1990, 1 Jan. 1968: AMS I. 21203-001 (2, 67～78 HL, 245+～315+ TL); CAS 42488 (1, 54 HL, 234 TL); NSMT-P 18508～18512 (5, 60～79 HL, 242～291 TL); ZUMT 54202～54205 (4, 73～81 HL, 299～339 TL); south of Tasmania, 47°15.1′S, 148°30.8′E, 949 m, bottom temp. 5.54°C, otter trawl, Kaiyo Maru sta. T-

60, 22 Dec. 1975: LACM 11447-5 (1, 60 HL, 263 TL); south of Tasmania, 47°21′~18′S, 147°52′~51′E, 915 m, Eltanin sta. 1981, 24 Feb. 1967: LACM 11449-2 (1, 74 HL, 320 TL); south of Tasmania, 47°11′S, 147°47′E, 1034 m, Eltanin sta. 1983, 24 Feb. 1967.

Other specimens: Western South Atlantic off Falkland Islands (1 specimen, 1 locality). LACM 10449-6 (1, 67 HL, 338 TL); South Atlantic off Falkland Is., 51°58′~52°01′S, 56°38′W, 845 m, 5′ Blake trawl, Eltanin sta. 558, 14 Mar. 1963.

Western South Pacific off Tasmania and New Zealand (9 specimens, 3 localities). TFDA uncat. (1, 78 HL, 306 TL); 920~1000 m, trawled by Kaiyo Maru off South Tasman Rise, 22 Dec. 1975: FAKU 43767 (1, 64 HL, 264 TL); FAKU 43769 (1, 89 HL, 434 TL); FSFL D2047 (4, 73~90 HL, 287+~342 TL); off New Zealand, 48°16.0′S, 177°55.4′E, 1020 m, Kaiyo Maru sta. T-27, 14 Dec. 1970; FAKU 43784 (1, 84 HL, 313+ TL); FAKU 43790 (1, 80 HL, 299+ TL); off New Zealand, 53°59.0′S, 169°57.4′E, 950 m, Kaiyo Maru sta. T-63, 11 Jan. 1971.

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タスマニア・ニュージーランドおよびフォークランド諸島より得た1新種 *Coelorinchus kaiyomaru* の記載

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水産庁開洋丸のオーストラリア・ニュージーランド沖漁場調査の際，タスマニアとニュージーランド沖より得られたソコダラ科の1新種 *Coelorinchus kaiyomaru* を記載した．本種は吻が長く鋭く尖り，吻長が眼窩径の1.4～1.9倍，鼻骨中・側突起が吻の前側縁に沿って癒合しない；眼下隆起縁上の変形鱗列は後鼻孔下から2列になる；吻部上面両側の無鱗域は極めて狭い；胴部を暗青色の帯が完全に取巻いている；発光器は肛門直前の小黒色無鱗域で極めて短く，二次発光腺を欠くことで他のトウジン属の種と区別される。米国エルタニン号によってフォークランド諸島沖より得た1個体は体部の鱗上の中央棘列が肥大しない等の点を除いて，ニュージーランド・タスマニア産のものと明瞭な相異は認められなかった．この相異が地理的なものか，種を異にするものかは，将来多くの標本を基に検討する必要がある．尚，本種は最近 *C. innotabilis* の大型個体として報告された (Iwamoto, 1978).

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